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| Project | **Head Mounted Display (HMD) Based 3D Content Motion Sickness Reducing Technology**  <<http://sites.ieee.org/sagroups-3079/>> |
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| Abstract |  |
| Purpose |  |
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* **Cybersickness (가상현실멀미, 사이버멀미)**: Psychological and physiological symptoms similar to those of motion sickness. Cybersickness symptoms include discomfort, stomach awareness, nausea, pallor, cold sweating, eye fatigue, and disorientation during or as a result of experiencing virtual environments, especially using head-mounted displays.
* **VR fidelity (가상현실 충실도)**: The level of similarity in sensation and perception between real and virtual environments.
* **Motion sickness (MS, 멀미)**: Psychological and physiological symptoms which are caused by discordinance between visually perceived movement and sense of bodily movement in the vestibular organs.
* **Vestibular system (전정계)**: The sensory system that provides a sense of bodily movement and balance and spatial orientation for the purpose of coordinating movement.
* **Proprioception (고유감각)**: The sense of the positions and movements of a person’s own limbs and trunk, plus the strength employed in such movements.
* **Simulator sickness (시뮬레이터 멀미)**: Psychological and physiological symptoms similar to those of motion sickness, typically experienced by pilots and drivers who receive simulator training.
* **Vection (벡션)**: Visually induced illusions of self-motion experienced by physically stationary observers in real environment or in virtual environment.
* **Visually induced motion sickness (VIMS)**: Sensations and perceptions similar to those of motion sickness, without any bodily movement. VIMS is an umbrella term to describe symptoms exclusively driven by visual stimulation without physical movement.
* **Sensory mismatch (감각불일치)**:The discrepancy between different sensations related to orientation and movement, especially from the visual and the vestibular organs, which causes motion sickness and cybersickness (VIMS, simulator sickness etc.).
* **Head-mounted display (HMD)**: Audio-visual displays that can be mounted on the head to provide users with virtual reality.
* **Optical flow (시각적 흐름)**: Apparent visual motions of objects, surfaces, and edges which are relative visual movements between the observer and a scene.
* **Frame of reference (참조틀)**: Referential objects (e.g., trees, clouds, and frames) that are stationary in a moving scene. These referential objects are known to prevent motion sickness and cybersickness.
* **Reference object (참조체)**: A visual scene or component that provides stationary location or orientation cue, and which matches the vestibular signal.
* **Field of view (FOV: 시야각)**: The angular width of a screen that fills the user’s visual field. Field of view is measured on the diagonal length of a screen. Field of view can be divided into two categories: hardware FOV which includes external FOV, display FOV, physical FOV, and real FOV; and content FOV includes internal FOV, camera FOV, virtual FOV, and geometric FOV.
* **Latency (잠재기)**: The measure of the response time delay in a system from a real time signal.
* **Controllability (통제성)**: The level of control over VR content, which can be either an active control experience or passive exposure to VR content. The more passive the VR experience is, the less controllability the user has.
* **Stereoscopy (입체시)**: Three-dimensional vision with the illusion of depth from two-dimensional images using the retinal disparity.
* **Objective measurement (객관적 측정)**: Quantification of the user’s behavioral and physiological changes. In the study of cybersickness, objective measures include the user’s magnitude of postural sway and physiological signals, such as measured by an electroencephalogram (EEG), electrogastrogram (EGG), or electrocardiogram (ECG) etc.
* **Subjective measurement (주관적 측정)**: Quantification of the user’s subjective experiences. In the study of cybersickness, subjective measures include scores on the Simulator Sickness Questionnaire (SSQ), Nausea scale, Fast motion sickness scale (FMS), and Misery scale (MISC) etc.
* **Sensory conflict theory (감각갈등이론)**: A working hypothesis to explain the physiological mechanism of motion sickness and cybersickness. Sensory disparity between the visual and the vestibular systems can induce symptoms of motion sickness and cybersickness.
* **Postural sway (자세동요)**: A means of detecting and predicting the magnitude of motion sickness and cybersickness. The more users experience symptoms of an illness, the more unstable their postural will be. It has been well established that when users experience severe cybersickness, the center of pressure against the gravity axis moves more.
* **Electroencephalogram (EEG, 뇌전도)**: Electrophysiological signals recorded noninvasively from the brain with the electrodes placed along the scalp.
* **Electrogastrogram (EGG, 위전도)**: Electrophysiological signals produced from stomach activities which record the stomach muscles’ contractions.
* **Correlation analysis (상관분석)**: A method of statistical measure used to evaluate the strength of relationships with more than two variables.
* **Simulator Sickness Questionnaire (SSQ, 시뮬레이터 멀미 설문지)**: A standard questionnaire used to measure the magnitude of simulator sickness symptoms.
* **Nausea scale (메스꺼움 척도)**: This measures a user’s symptoms of nausea . Users are asked to quantify their discomfort levels using a 0-5 scale. Nausea levels are reported verbally every minute.
* **Fast motion sickness scale (FMS)**: The FMS represents only the lowest (0) and the highest (20) scores. Motion sickness symptoms are reported verbally every minute, including general discomfort, and stomach awareness.
* **Misery scale (MISC)**: This measures cybersickness symptoms using a 0-10 scale. The higher the MISC score reported, the more severe the cybersickness experienced.
* **(Global) visual flow (시각적 흐름)**: A concept similar to optic flow, which can be divided into global or local visual flow.
* **Spatial velocity (공간속도)**: The velocity of virtual scene movement which represents the speed of the scene movement.
* **Speed of VR content (가사현실 컨텐츠 속도)**: One of the factors of optical flow. The faster the speed of an object, the larger the measurement of the optical flow.
* **Number of motion axes (운동축의 개수)**: The number of directional and rotational factors of optical flow. This number influences the magnitude of cybersickness and motion sickness.
* **Background complexity (배경복잡도)**: The number of figures, colors, and sizes of objects, and the level of optical flow in background scene. Cybersickness may be influenced by background complexity.
* **Reality-Virtual Continuum (현실-가상현실 연속선)**: The level of mixture of real and virtual objects presented in display devices. Real environments are situated at one end of the continuum, and virtual environments are at the other end of the continuum.
* **Depth of field (초점심도)**: The effective focus range or distance between the nearest and farthest objects in a moving scene used to ensure sharp images.
* **Eye dominance (안 지배성):** The preference of processing visual input by the left or right eye.
* **Interpupillary distance (IPD, 동공간 거리):** The distance between the centers of the pupils of the left and the right eyes.
* **Inter-ocular distance (IOD, 안구-접안렌즈간 거리):** The distance between the ocular lens ofHMD optical systems and eyes.